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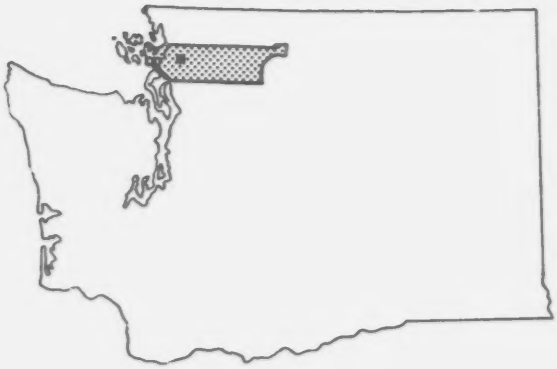
FLOOD INSURANCE STUDY

CITY OF SEDRO WOOLLEY, WASHINGTON
SKAGIT COUNTY



REVISED: DECEMBER 5, 1989

Federal Emergency Management Agency

COMMUNITY NUMBER-530159

NOTICE TO
FLOOD INSURANCE STUDY USERS

Communities participating in the National Flood Insurance Program have established repositories of flood hazard data for floodplain management and flood insurance purposes. This Flood Insurance Study may not contain all data available within the repository. It is advisable to contact the community repository for any additional data.

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FLOOD INSURANCE STUDY
CITY OF SEDRO WOOLLEY, SKAGIT COUNTY, WASHINGTON

1.0 INTRODUCTION

1.1 Purpose of Study

This Flood Insurance Study investigates the existence and severity of flood hazards in the City of Sedro Woolley, Skagit County, Washington, and aids in the administration of the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973. This study has developed flood risk data for various areas of the community that will be used to establish actuarial flood insurance rates and assist the community in its efforts to promote sound floodplain management. Minimum floodplain management requirements for participation in the National Flood Insurance Program (NFIP) are set forth in the Code of Federal Regulations at 44 CFR, 60.3.

This Flood Insurance Study revises and udpates a previous Flood Insurance Study/Flood Insurance Rate Map for the City of Sedro Woolley, Washington. This information will be used by the City of Sedro Woolley to update existing floodplain regulations as part of the Regular Phase of the NFIP. The information will also be used by local and regional planners to further promote sound land use and floodplain development.

In some States or communities, floodplain management criteria or regulations may exist that are more restrictive or comprehensive than the minimum Federal requirements. In such cases, the more restrictive criteria take precedence and the State (or other jurisdictional agency) will be able to explain them.

1.2 Authority and Acknowledgments

The sources of authority for this Flood Insurance Study are the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973.

The hydrologic and hydraulic analyses for the January 5, 1982, study were performed by the U.S. Army Corps of Engineers (COE), Seattle District, for the Federal Emergency Management Agency (FEMA), under Inter-Agency Agreement No. IAA-H-7-76, Project Order No. 20. This study was completed in November 1980 and covered all significant flooding sources affecting Sedro Woolley.

The study was revised to add detailed flooding for the southwest section of Sedro Woolley adjacent to Skagit County, Washington. The hydrologic and hydraulic analyses for this area were based on the Flood Insurance Study for Skagit County, Washington, dated October 17, 1984 (Reference 1).

1.3 Coordination

The final coordination meeting was held on August 13, 1981, and was attended by representatives of FEMA, the study contractor, and the city. All problems raised at the meeting have been resolved.

2.0 AREA STUDIED

2.1 Scope of Study

This Flood Insurance Study covers the incorporated areas of the City of Sedro Woolley, Skagit County, Washington. The area of study is shown on the Vicinity Map (Figure 1).

Approximately 3.4 miles of Skagit River were studied by detailed analyses. The areas studied by detailed methods were selected with priority given to all known flood hazard areas and areas of projected development or proposed construction through 1985.

2.2 Community Description

The City of Sedro Woolley is located in west-central Skagit County, in northwestern Washington. The city is approximately 5 miles east of Burlington, Washington. Sedro Woolley is at the intersection of State Highways 7, 9, and 20 and is also served by the Burlington Northern Railroad.

The community was settled in 1878 by David Batey and Joseph Hart, who sold 40 acres to Mortimer Cook in 1884. Mr. Cook laid out a townsite and intended to "bestow upon the new town a name such as no other town in America should have, and if such could be found he cared little whether or not it was euphonious or elegant." He eventually concluded to name the place "Bug" (Reference 2). Outraged settlers threatened to add the prefix "hum" to the town sign before townswomen finally convinced Cook to rename the town Sedro, from the Spanish word cedro, meaning "cedar." Because of its strategic location, the town became the head of navigation on the Skagit River and prospered, particularly during the Mt. Baker gold-rush days. In 1889, the Great Northern and Northern Pacific Railroads established a junction north of Sedro, and P.A. Woolley platted a townsite at the crossing bearing his name. To mitigate the high costs of duplicate governments, the adjacent towns were incorporated (with a now-forgotten hyphen) as Sedro-Woolley in 1890 (Reference 3).

Sedro Woolley is the center of a region that has successfully accomplished the transition from large-scale logging and lumbering to farming. The area supports a large number of fruit, vegetable, dairy, and poultry farms. Within the corporate limits, there are a heavy equipment manufacturing firm, an electronics equipment firm, two lumber mills, and numerous small commercial businesses. The estimated population of Sedro Woolley in 1980 was 5,600 (Reference 4).

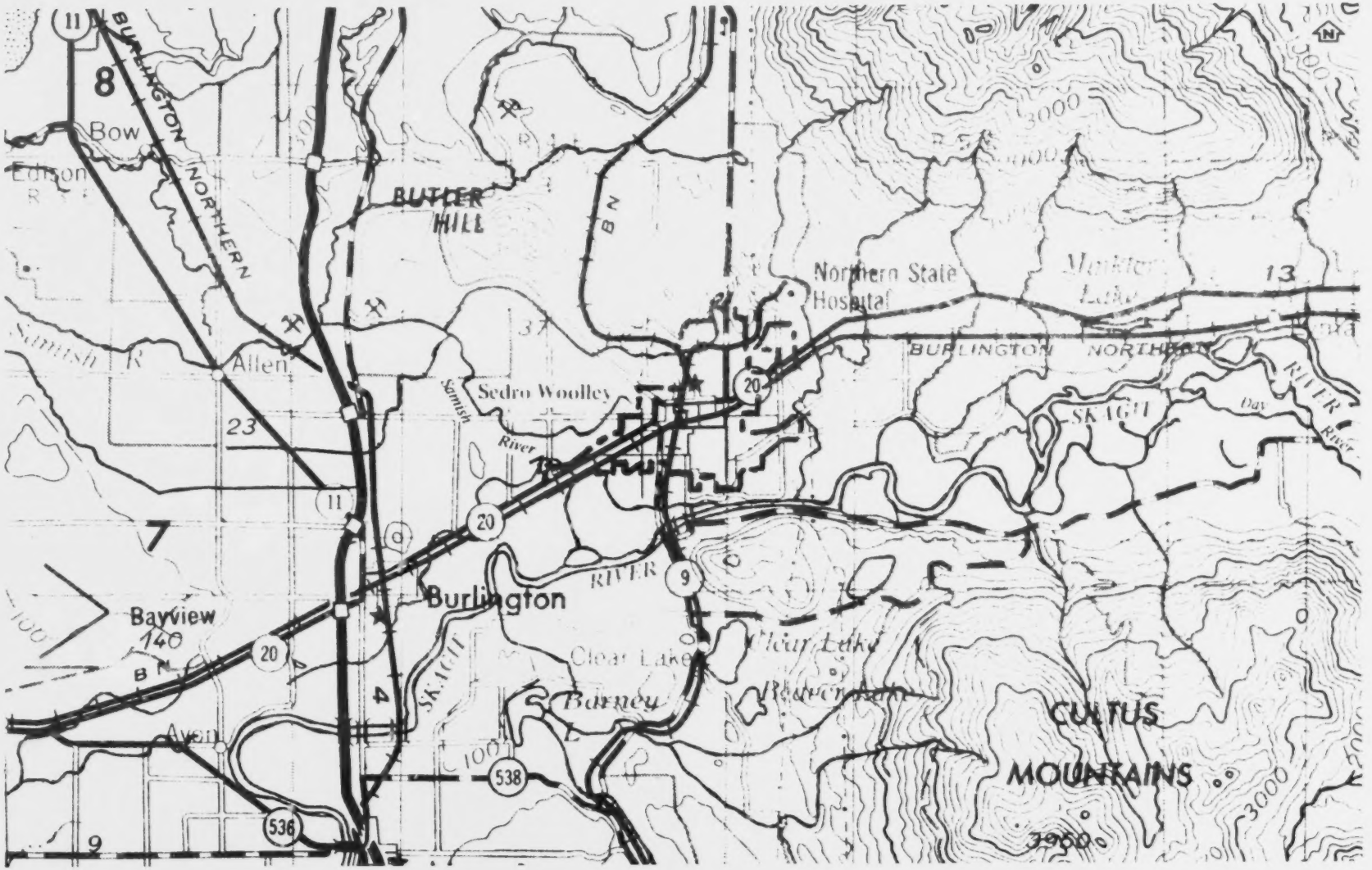


FIGURE 1

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF SEDRO WOOLLEY, WA
(SKAGIT CO.)

APPROXIMATE SCALE

2 0 2 4 6 MILES

VICINITY MAP

Located on the right bank of the Skagit River valley, elevations within Sedro Woolley range from 36 to 56 feet. To the east are the foothills of the Cascade Range, rising to 4,000 feet in elevation, and to the west is the low-lying Skagit River delta. Underlying Sedro Woolley are bottom-land soils consisting of silt loam and fine sandy loam which were deposited by the river. Most of the land within Sedro Woolley is cleared. In areas with sufficient soil moisture, the vegetation is primarily deciduous with species of alder, maple, willow, cottonwood, brush, grass, and vines (Reference 5).

The climate of Sedro Woolley is predominantly a midlatitude, west coast, marine type because most of the airmasses that reach the area originate over the Pacific Ocean. In late fall and winter, these airmasses are moist and at approximately the same temperature as the ocean surface. Orographic lifting and cooling as airmasses are carried inland by prevailing westerly winds result in cloudiness and widespread precipitation over Sedro Woolley and the surrounding area. Sedro Woolley has an average of 46 inches of rainfall annually, of which 50 percent falls in the 4 months, October through January, and 75 percent occurs in the 7 months, October through April. Average annual snowfall is 11 inches. Average monthly temperatures range from 38°F in January to 63° in July. Record temperatures are 99° and -2°F (Reference 6).

2.3 Principal Flood Problems

The principal flooding source of Sedro Woolley is the Skagit River. Major floods in the vicinity of Sedro Woolley are caused primarily by winter rainstorms. Floods of this type usually occur in November or December, but may occur as early as October or as late as February. These floods are characterized by sharply rising riverflows, high magnitude peaks, and flood durations of several days. Heavy rainfall is often accompanied by snowmelt which increases the runoff. Not uncommon are two or more storms in rapid succession, sometimes less than 24 hours apart.

Spring floods also occur on the Skagit River and are due primarily to snowmelt runoff. However, these events are not of sufficient magnitude to be a serious flood threat to Sedro Woolley.

Information about past floods in Sedro Woolley is scarce, which suggests that the flood hazard is relatively mild. The estimated 100-year flood will inundate approximately 200 to 300 acres, primarily in the southwestern part of the city. The floodplain contains a county maintenance shop, a sewage treatment plant, a lumber mill, and some residences.

Flooding in the vicinity of Sedro Woolley during the flood of December 1979 is shown in Figure 2.

Figure 2. Flooding in Vicinity of Sedro Woolley During Flood of December 1979, Looking Downstream Toward Burlington Northern Railroad and State Highway 9 Bridges (Flooded Areas Are Outside Sedro Woolley Corporate Limits)

2.4 Flood Protection Measures

During the spring snowmelt period and, to a lesser degree, during the winter when Skagit River discharges at Concrete, Washington, are less than 90,000 cubic feet per second (cfs), varying degrees of incidental flow regulation occur on the Baker and Skagit Rivers due to hydropower operation of existing reservoirs on both rivers. The amount of water in excess of that required for power generation is either passed through the system or stored for future use. This is especially true during the spring, when reservoir stage is raised from low winter levels to normal full pool elevations. Raising the pool in this manner tends to decrease the peak flow downstream.

The City of Seattle (Seattle City Light) owns and operates a system of three hydroelectric power plants on the upper Skagit River at Diablo, Ross, and Gorge Dams. These have been in operation since 1930, 1940, and 1960, respectively. Ross Reservoir, the only reservoir with available flood storage, has 1,052,300 acre-feet of usable storage between elevations 1,602 and 1,475 feet, of which 120,000 acre-feet are reserved for flood control in compliance with the Federal Regulatory Commission license.

Puget Power operates two hydroelectric power projects on the Baker River. These are Lower and Upper Baker Dams and Reservoirs located at River Miles 1.12 and 9.29, respectively. Baker River streamflows have been subject to varying degrees of flood control regulation since completion of the Lower Baker Dam project in 1927 and the Upper Baker Dam project in 1959. Flood control storage was increased in 1977 from 16,000 to 74,000 acre-feet at the Upper Baker project to more effectively regulate Skagit River flows west of Concrete. During the November through March flood season, flood control regulation commences when Skagit River discharges near Concrete are forecast to reach or exceed 90,000 cfs. The COE then directs flood control operations for the Ross and Baker projects. Project releases are selected with reference to formal operating plans which consider flow at Concrete, reservoir pool elevations, and observed and forecast reservoir inflows. Releases from both projects are regulated to minimum levels until the flood peak has passed and the Skagit River has begun to recede at Concrete. Subsequently, project discharge is increased to draft storage from the reservoirs, so that flood control storage space is regained.

Storage data for the major dams within the Skagit River basin are given in Table 1.

City officials in cooperation with the Skagit River County Planning Department are complying with the Emergency Phase of the NFIP by using building permit regulations and procedures to regulate floodplain development in accordance with the best available floodplain information.

Table 1. Storage Characteristics of Existing Reservoirs

Reservoir	Flood Control Storage (Acre-Feet)	Maximum Storage (Acre-Feet)	Maximum Usable Storage (Acre-Feet)	Date Storage Began
Ross	120,000	1,434,800	1,052,300	March 1940
Diablo	0	90,140	76,220	October 1929
Gorge	0	8,485	6,700	June 1960
Upper Baker (Baker Lake)	74,000	285,470	220,630	July 1959
Lower Baker (Lake Shannon)	0	Unknown	142,600	November 1925

3.0 ENGINEERING METHODS

For the flooding sources studied in detail in the community, standard hydrologic and hydraulic study methods were used to determine the flood hazard data required for this study. Flood events of a magnitude which are expected to be equaled or exceeded once on the average during any 10-, 50-, 100-, or 500-year period (recurrence interval) have been selected as having special significance for floodplain management and for flood insurance premium rates. These events, commonly termed the 10-, 50-, 100-, and 500-year floods, have a 10-, 2-, 1-, and 0.2-percent chance, respectively, of being equaled or exceeded during any year. Although the recurrence interval represents the long term average period between floods of a specific magnitude, rare floods could occur at short intervals or even within the same year. The risk of experiencing a rare flood increases when periods greater than 1 year are considered. For example, the risk of having a flood which equals or exceeds the 100-year flood in any 50-year period is approximately 40 percent (4 in 10), and, for any 90-year period, the risk increases to approximately 60 percent (6 to 10). The analyses reported here reflect flooding potentials based on conditions existing in the community at the time of completion of this study. Maps and flood elevations will be amended periodically to reflect future changes.

3.1 Hydrologic Analyses

Hydrologic analyses were carried out to establish the peak discharge-frequency relationships for floods of the selected recurrence intervals for each flooding source studied in detail affecting the community.

The U.S. Geological Survey (USGS) gaging stations on the Skagit River near Concrete, Washington (1924 to present), and near Sedro Woolley (1908 to 1928 and 1975 to 1980) were the principal stream gaging stations used to establish the various floodflow frequencies used in this study. Additional data from other USGS stream gages within the Skagit River basin and supplemental flow data supplied by Puget Power and Seattle City Light were also used in the analyses. Methodology used in preparation of the various discharge-frequency curves is consistent with the guidelines established by the Hydrology Committee of the U.S. Water Resources Council (Reference 7) and includes the expected probability adjustments described in Appendix II.

The effects of upstream regulation on discharge-frequency relationships necessitated developing a hydrologic routing model for the Skagit River. Discharge data from various observed floods were used to calibrate a Streamflow Synthesis and Reservoir Regulation Model (SSARR) developed by the COE North Pacific Division (Reference 8).

The input for the model were discharges for Ross Reservoir, the Cascade River, the Sauk River, and the Baker River, plus estimates of local inflow. The resulting computed hydrograph at Concrete was then compared to the actual recorded hydrograph at Concrete for each flood. Appropriate adjustments were made to the model so the computed hydrograph, on the average, approached the actual observed hydrograph at Concrete. A comparison of four partially observed stage hydrographs at Sedro Woolley was also made to arrive at the proper routing coefficients for the Concrete-Sedro Woolley reach. The Sedro Woolley-Skagit Bay reach calibration was based on high-water profiles, tidal cycles, and the computed Sedro Woolley hydrograph.

Hypothetical unregulated hydrographs contributing to the 10-, 50-, 100-, and 500-year floods at Concrete were developed as a first step in the analysis of effects of regulation by the Ross and Baker projects. The hydrographs contributing to the respective unregulated floods at Concrete were based upon correlations between discharges at Concrete and upstream locations. Hydrographs were developed to represent Ross and Baker projects inflow, major tributary discharges, and other local inflows. The adequacy of the contributing inflow hydrographs was verified by comparing the upstream hydrographs routed to Concrete utilizing the SSARR model with a corresponding hydrograph based upon analysis of the observed record at Concrete.

Regulated frequency curves for the Skagit River near Concrete and Sedro Woolley were based on regulation of the hypothetical 10-, 50-, 100-, and 500-year hydrographs. Regulation of Ross and Baker Reservoirs was simulated by replacement of the respective unregulated discharge hydrographs in the SSARR model with regulated hydrographs. All other input remained unchanged, and the flood was then routed through the basin.

Both the natural and regulated discharge-frequency relationships at Mount Vernon are based on the assumption that the intervening local inflow between Sedro Woolley and Mount Vernon is insignificant and that, for example, a 50-year frequency flow at Sedro Woolley is also a 50-year frequency flow at Mount Vernon. The natural and regulated discharge-frequency relationships are based on data from the hydraulic model of the lower river. Using the model, various frequency flows were routed from Sedro Woolley to Mount Vernon. Discharges with less than a 10-year recurrence interval were based on a flow relationship between Sedro Woolley and Mount Vernon. The Mount Vernon discharge-frequency relationship reflects the fact that flow can be expected to escape from the Skagit River between Sedro Woolley and Mount Vernon and flow into the Samish River when Sedro Woolley discharges exceed approximately 150,000 cfs.

The 100-year flood discharge from the Skagit River downstream from Sedro Woolley was estimated to be 240,000 cfs by the COE (Reference 9). In analyzing overbank flooding a discharge of 110,000 cfs was estimated to be carried by the Skagit River channel with the remaining 130,000 cfs in the overbank areas. Downstream of State Highway 9, the flow is divided into channel and overbank flows above the upstream end of the levee system near Sterling. From this point, the overbank flooding flows past Burlington and again divides to flow through the Samish River floodplain into Padilla Bay and through the Skagit River floodplain into Swinomish Slough and Skagit Bay.

Because of the complex nature of the divided overbank floodflows, it was necessary to perform several HEC-2 analyses (Reference 9) for a range of discharges along each path. The results were used to develop stage-discharge rating curves for each path. From these rating curves, discharges were selected for each path; the discharges produced a common elevation at the point of bifurcation of the two paths. It then was determined that 86,000 cfs will flow into Samish and Padilla Bays, and 44,000 cfs will flow into Skagit Bay (Figure 3). Peak discharge-drainage area relationships for the Skagit River are shown in Table 2.

Table 2. Summary of Discharges

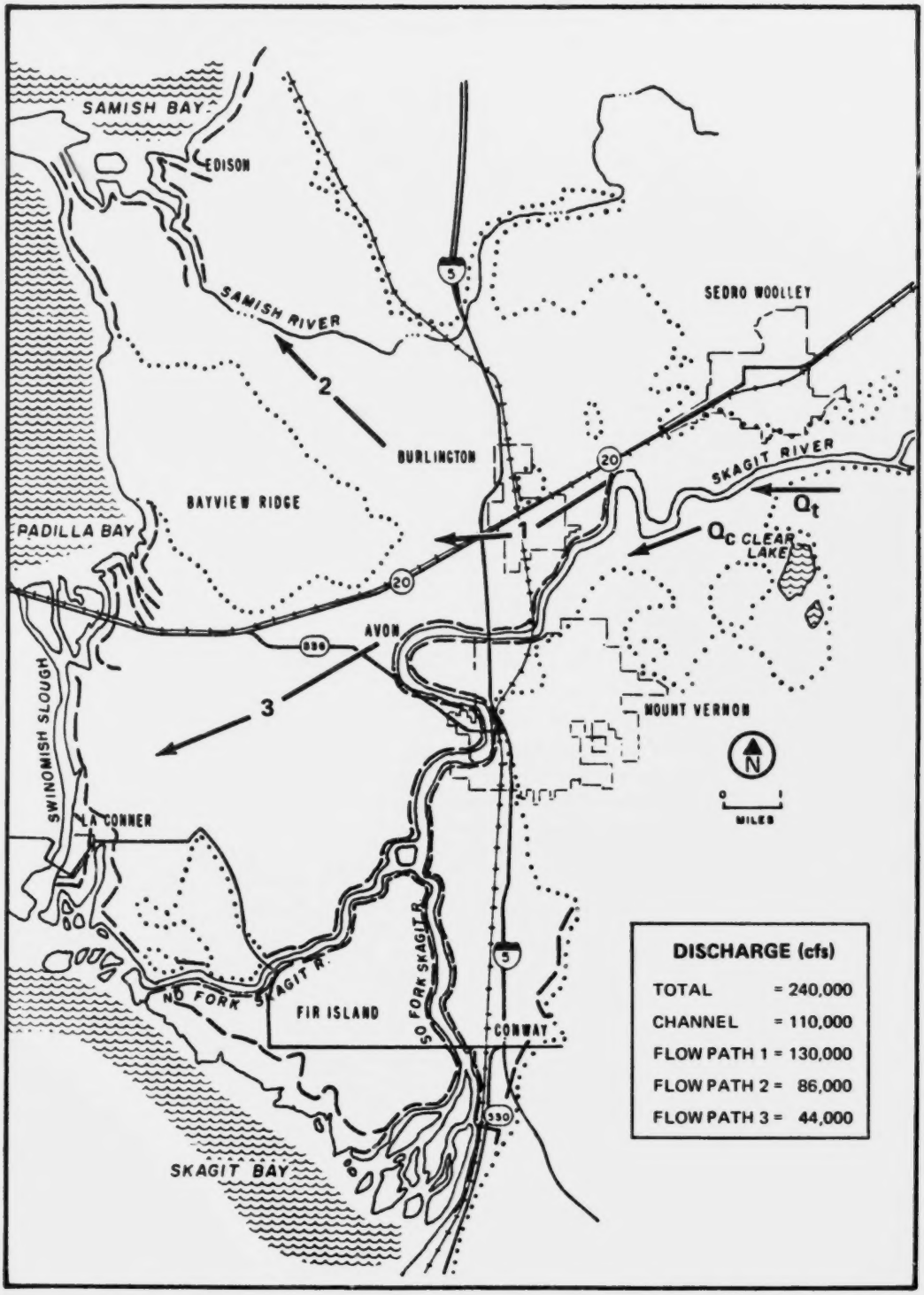
Flooding Source and Location	Drainage Area (Square Miles)	Peak Discharges (cfs) 10-Year	50-Year	100-Year	500-Year
Skagit River					
Near Concrete	2,737	124,000	193,000	226,000	329,000
Near Sedro Woolley	3,015	132,000	200,000	229,000	321,000[1]
Near Mount Vernon	3,093	124,000[1]	162,000[2]	185,000[2]	245,000[2]

[1]Decrease Due to Storage Upstream
[2]Decrease Due to Channel Routing Losses and Overbank Losses

3.2 Hydraulic Analyses

Analyses of the hydraulic characteristics of the flooding sources studied in the community were carried out to provide estimates of the elevations of floods of the selected recurrence intervals along each of these flooding sources.

The backwater computations for the Skagit River upstream from State Highway 9 utilized computer program No. 722-K5-G311 developed by the COE, Seattle District, which computes both natural and floodway water-surface elevations using the principles of Method II, Engineering Manual 1110-2-1409 (Reference 10).



DISCHARGE DISTRIBUTION IN DELTA AREA

FIGURE 3

The backwater model from Sedro Woolley to Concrete was considered satisfactorily calibrated when over 80 percent of the observed water-surface elevations of the December 4, 1975, flood were reproduced within 0.5 foot, and the majority of these were within 0.2 foot. Most of the remaining 20 percent were within 1.2 feet, with a maximum difference between observed and computed water-surface elevations of 2.2 feet at one point. This flood has an estimated recurrence interval of 10 years.

Water-surface elevations for the overbank flowpath downstream of State Highway 9 were computed using the HEC-2 computer program (Reference 9). Use of the computer model was replaced or supplemented with hand calculations in certain areas and situations where such methods were considered to be more suitable.

All channel cross sections were field surveyed, and overbank sections were developed photogrammetrically. All bridges were field checked to obtain elevation data and structural geometry.

Thirty-two cross sections surveyed in 1963 and 10 cross sections surveyed in 1977 were used in the hydraulic analysis of the Skagit River from Sedro Woolley to Concrete. In the Skagit River delta, new river cross sections were surveyed in late 1977 and early 1978 to supplement those surveyed in 1961. Most cross sections used in the computer model were surveyed after the 1975 flood.

River mile stationing was established by interpolating between key landmarks (such as bridges) for which the river mile stationing is specified in the River Mile Index (Reference 11). Because of the channel changes since the index was published, the published distances between index stations do not always agree with the maps. In such cases, measured distances between cross sections were used in the backwater computations rather than the stationing distances given in the index.

Geometric data for each bridge were included in the backwater model, and the type of flow and the associated velocity head loss at each bridge were computed. The computed water-surface elevations reflect these head losses. Controlling features such as roads, railroads, fills, and levees were included by selecting the cross section locations to include and reflect these controlling features. No allowances were made in the backwater study model for possible accumulation of debris at bridges or at any cross section, or for future sedimentation.

Locations of selected cross sections used in the hydraulic analysis are shown on the Flood Profiles (Exhibit 1).

Channel and overbank roughness factors (Manning's "n") for the Skagit River were initially based on empirical methods, then were adjusted where required during model calibration. Field inspections and photographs aided the "n" value determination. Final roughness values ranged from 0.032 to 0.046 for the channel and from 0.055 to 0.075 for the overbank areas near Sedro Woolley.

Starting water-surface elevations at Sedro Woolley were obtained from a backwater analysis for the Skagit County, Washington, Flood Insurance Study (Reference 1).

Flood profiles were drawn showing computed water-surface elevations to an accuracy of 0.5 foot for floods of the selected recurrence intervals (Exhibit 1).

The hydraulic analyses for this study were based on unobstructed flow. The flood elevations shown on the profiles are thus considered valid only if hydraulic structures remain unobstructed, operate properly, and do not fail.

All elevations are referenced to the National Geodetic Vertical Datum of 1929 (NGVD). The elevation reference mark used in this study is shown on the maps; the description of the mark is presented in Elevation Reference Marks (Exhibit 3).

4.0 FLOODPLAIN MANAGEMENT APPLICATION

The NFIP encourages State and local governments to adopt sound floodplain management programs. Therefore, each Flood Insurance Study provides 100-year flood elevations and delineations of the 100- and 500-year floodplain boundaries and 100-year floodway to assist communities in developing floodplain management measures.

4.1 Floodplain Boundaries

To provide a national standard without regional discrimination, the 1-percent annual chance (100-year) flood has been adopted by FEMA as the base flood for floodplain management purposes. The 0.2-percent annual chance (500-year) flood is employed to indicate additional areas of flood risk in the community. For each stream studied in detail, the 100- and 500-year floodplain boundaries have been delineated using the flood elevations determined at each cross section. Between cross sections, the boundaries were interpolated using topographic maps at a scale of 1:4,800, with a contour interval of 5 feet (Reference 12).

The 100- and 500-year floodplain boundaries are shown on the Flood Insurance Rate Map (Exhibit 2). On this map, the 100-year floodplain boundary corresponds to the boundary of the areas of special flood hazards (Zone AE); and the 500-year floodplain boundary corresponds to the boundary of areas of moderate flood

hazards. In cases where the 100- and 500-year floodplain boundaries are close together, only the 100-year floodplain boundary has been shown. Small areas within the floodplain boundaries may lie above the flood elevations but cannot be shown due to limitations of the map scale and/or lack of detailed topographic data.

4.2 Floodways

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment in order that the 100-year flood may be carried without substantial increases in flood heights. A floodway was computed for the Skagit River upstream of State Highway 9. However, the entire floodway lies outside the Sedro Woolley corporate limits; therefore, no floodway is presented in this study.

5.0 INSURANCE APPLICATION

For flood insurance rating purposes, flood insurance zone designations are assigned to a community based on the results of the engineering analyses. The zones for Sedro Woolley are as follows:

Zone AE

Zone AE is the flood insurance rate zone that corresponds to the 100-year floodplains that are determined in the Flood Insurance Study by detailed methods. Whole-foot base flood elevations (BFEs) derived from the detailed hydraulic analyses are shown at selected intervals within this zone.

Zone X

Zone X is the flood insurance rate zone that corresponds to areas outside the 500-year floodplain, areas within the 500-year floodplain, areas of 100-year flooding where average depths are less than 1 foot, areas of 100-year flooding where the contributing drainage area is less than 1 square mile, and areas protected from the 100-year flood by levees. No BFEs or depths are shown within this zone.

6.0 FLOOD INSURANCE RATE MAP

The Flood Insurance Rate Map is designed for flood insurance and floodplain management applications.

For flood insurance applications, the map designates flood insurance rate zones as described in Section 5.0 and, in the 100-year floodplains that were studied by detailed methods, shows selected whole-foot BFEs or average depths. Insurance agents use the zones and BFEs in conjunction with information on structures and their contents to assign premium rates for flood insurance policies.

For floodplain management applications, the map shows by tints, screens, and symbols, the 100- and 500-year floodplains, and the locations of selected cross sections used in the hydraulic analyses.

7.0 OTHER STUDIES

Several reports concerning the Skagit River basin have been published. These include a flood control improvement report in 1965 (Reference 13); Flood Plain Information studies in 1966, 1967, and 1972 (Reference 14); a suggested hydraulic floodway for the Sauk River in 1976 (Reference 15); an authorization report for additional flood control at Upper Baker River project and accompanying draft Environmental Impact Statement (References 16 and 17); and a levee improvement study in 1979 (Reference 6).

Additional studies of the basin were published by the Puget Sound Task Force of the Pacific Northwest River Basins Commission in 1970 (Reference 18) and by the Skagit Regional Planning Council in 1973 (Reference 19).

This study supersedes the Flood Hazard Boundary Map for the City of Sedro Woolley, (Reference 20), the Flood Insurance Study for the City of Sedro Woolley (Reference 21), and agrees with the Flood Insurance Study being revised for Skagit County, Washington.

On November 10, 1978, under Public Law 95-625, portions of the Skagit River, upstream from Sedro Woolley and some tributaries, the Cascade, Suiattle, and Sauk Rivers, were incorporated into the National Wild and Scenic River System. Studies are being prepared by the U.S. Forest Service to detail boundaries of the river areas and prepare a management plan to protect and enhance those scenic, scientific, geological, historical, cultural, recreational, and fish and wildlife values for which the rivers were designated as a component of the National Wild and Scenic River System.

This study is authoritative for the purposes of the NFIP; data presented herein either supersede or are compatible with all previous determinations.

8.0 LOCATION OF DATA

Information concerning the pertinent data used in the preparation of this study can be obtained by contacting the Natural and Technological Hazards Division, FEMA, Federal Regional Center, 130 228th Street, SW., Bothell, Washington 98021-9796.

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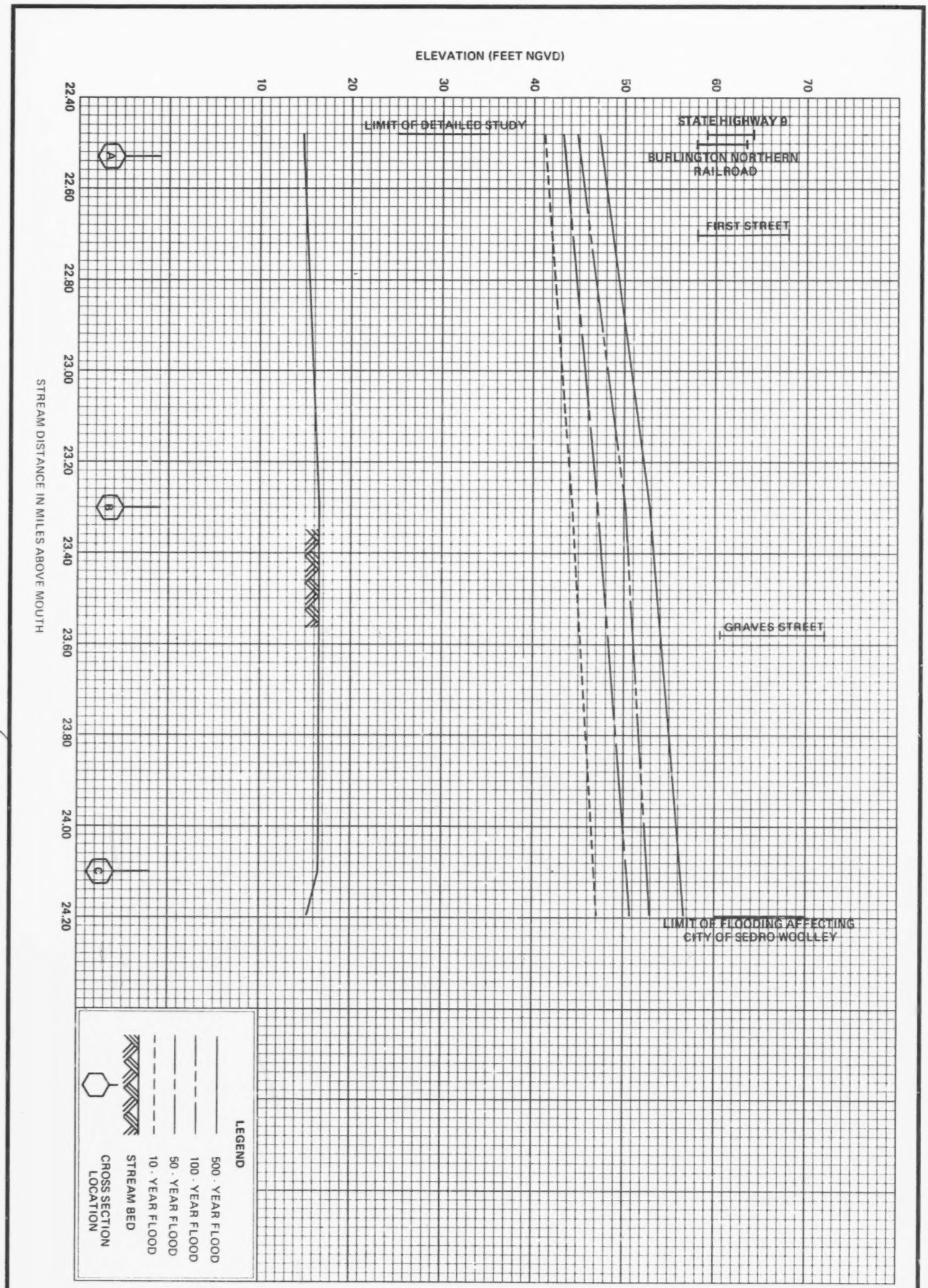
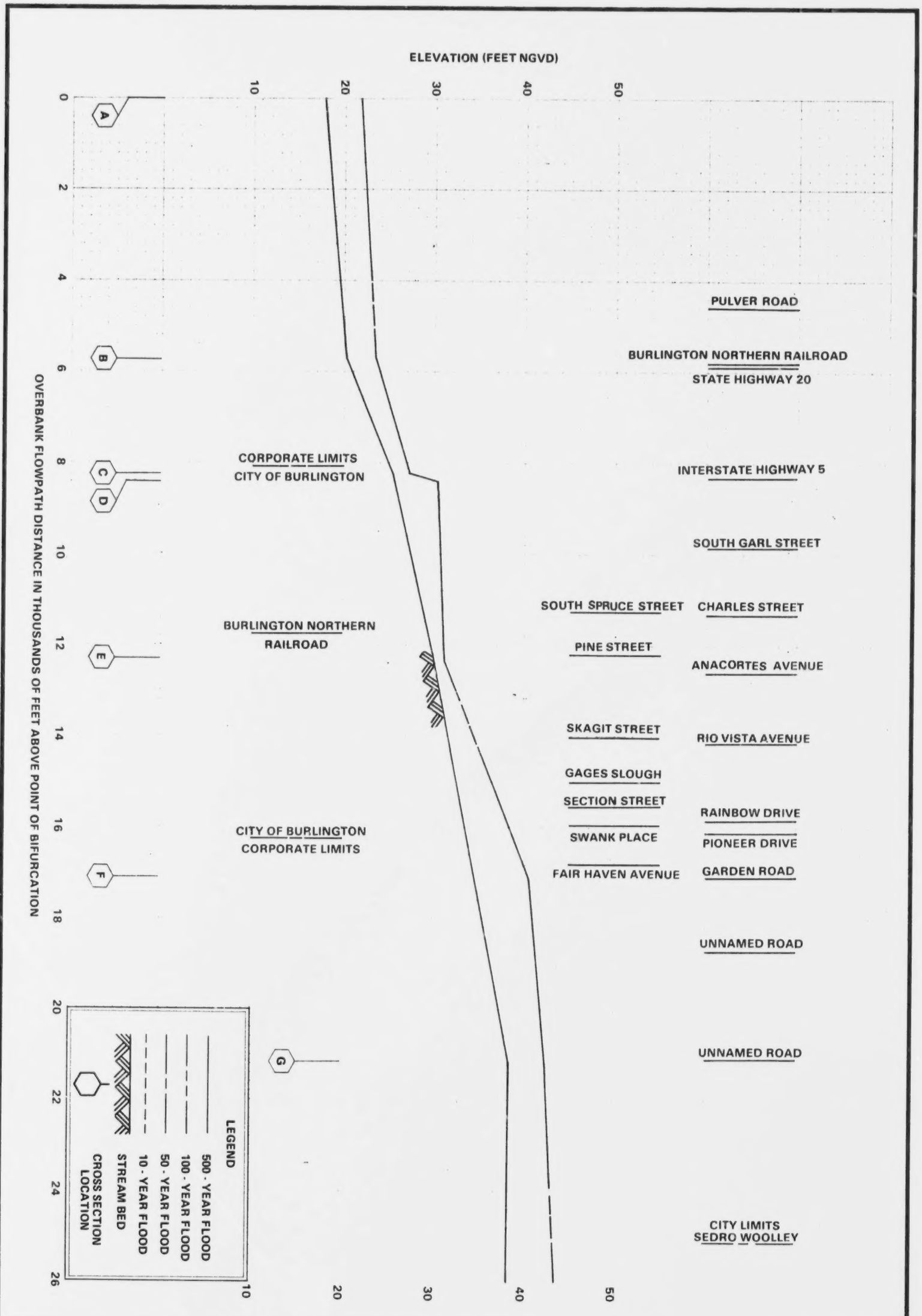
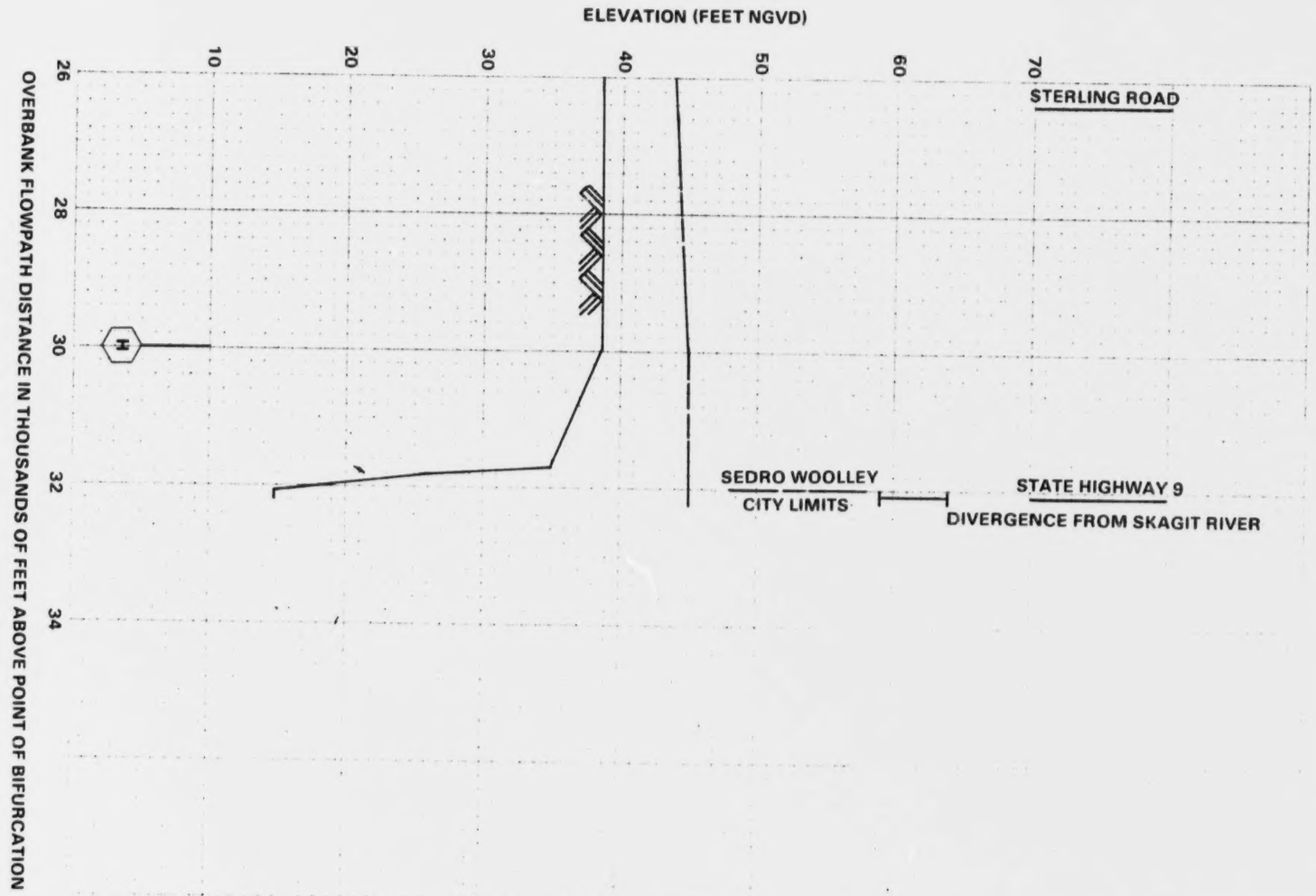


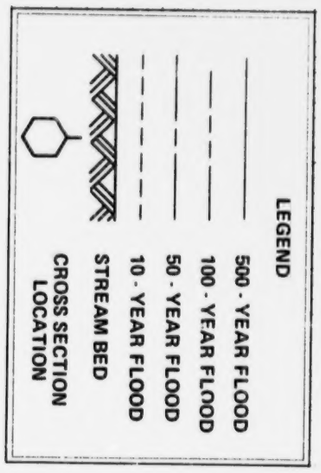
01P	FEDERAL EMERGENCY MANAGEMENT AGENCY CITY OF SEDRO WOOLLEY, WA (SKAGIT CO.)	FLOOD PROFILES SKAGIT RIVER



02P	FEDERAL EMERGENCY MANAGEMENT AGENCY CITY OF SEDRO WOOLLEY, WA (SKAGIT CO.)	FLOOD PROFILES SKAGIT RIVER DELTA, OVERBANK FLOWPATH 1



20



03P	FEDERAL EMERGENCY MANAGEMENT AGENCY CITY OF SEDRO WOOLLEY, WA (SKAGIT CO.)	FLOOD PROFILES SKAGIT RIVER DELTA, OVERBANK FLOWPATH 1

EXHIBIT 3 - ELEVATION REFERENCE MARKS

Reference Mark	Elevation (feet NGVD)	Description of Location
RM1	55.397	Bench mark disk stamped H455, at southeast corner of intersection of Woodworth Street and Eastern Avenue. Established by U.S. Coast and Geodetic Survey.